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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/694,090	10/19/2000	Philippe Guyot-Sionnest	7814/43	7386

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EXAMINER

UHLIR, NIKOLAS J

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 07/25/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

AS/4

Office Action Summary

Application No.

09/694,090

Applicant(s)

GUYOT-SIONNEST ET AL.

Examiner

Nikolas J. Uhlir

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33, 36-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) none is/are allowed.
- 6) ☒ Claim(s) 1-33 and 36-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☒ Interview Summary (PTO-413) Paper No(s) 14
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. This office action is in response to the amendment/arguments dated 5/06/03. The applicants amendment to claims 1 and 10 to include the requirement that the carrier remain in a quantum confined state at room temperature and in the absence of an applied electric potential is sufficient to overcome the previously cited prior art. However, the case is not in condition for allowance in light of the new grounds of rejection presented below.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-33 and 36-42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In the instant case, claims 1 and 10, upon which all of the other claims are dependent, require a semiconductor nanocrystal (and in the case of claim 10 a method for making a semiconductor nanocrystal) that has been doped with carrier selected from an electron or a hole, **such that the carrier remains in a quantum confined state at room temperature and in the absence of an applied electric potential.**

4. The limitation "such that the carrier remains in a quantum confined state" "in the absence of an applied electric potential constitutes new matter. In the instant case, there is no explicit support in the specification for the negative limitation "in the absence of an applied electric potential." Further, careful examination of the specification and examples has not yielded any clear indication that there is implicit support for this limitation. Thus, the limitation "in the absence of an applied electric potential" is new matter. Regarding the limitation requiring the carrier to "remain in a quantum confined state" at room temperature and in the absence of an applied electric potential, there is substantial doubt in the examiners mind as to whether the specification provides support for a nanocrystal that "remains" in a quantum confined state under these conditions. Evidence to this end is given in applicants own figure 3, which discloses an IR absorption peak that the applicant indicates as data confirming that a semiconductor nanocrystal is doped. The insert graphs in figure 3 illustrate that the absorption peak degrades over time, with the rate of decay depending on the material used as the nanocrystal. Further, applicants on page 11, lines 5-25 of the instant specification state that the "long term stability" of the doped nanocrystals is affected by their exposure to air and water vapor, and is "strongly temperature dependent" and that "at 20K the samples appear to be stable indefinitely" (page 11, lines 24-26). Thus, in light of the fact that applicant has clearly stated that the stability of the doped nanocrystals is strongly dependent and requires low temperature of 20K to be considered "stable," there appears to be no support in the specification for a doped semiconductor having a carrier that

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"remains in a quantum confined state at room temperature" in the absence of an applied electric potential.

5. Claims 1-33 and 36-42 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.
6. As written, claims 1 and 10, upon which all of the other claims are dependent, require a semiconductor nanocrystal (and in the case of claim 10 a method for making a semiconductor nanocrystal) that has been doped with carrier selected from an electron or a hole, such that the carrier remains in a quantum confined state at room temperature and in the absence of an applied electric potential.
7. There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any experimentation necessary is "undue." These factors include, but are not limited to: 1. The breadth of the claims. 2. The nature of the invention. 3. The state of the prior art. 4. The level of one of ordinary skill. 5. The level of predictability in the art. 6. The amount of direction provided by the inventor. 7. The existence of working examples. And 8. The quantity of experimentation needed to make or use the invention based on the content of the disclosure. See MPEP 2164.01(a).
8. As written, claims 1 and 10 are considered by the examiner to be broad, as they encompass "any" doped semiconductor nanocrystal that can be doped with an electron

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or a hole such that the electron or hole is in a quantum confined state at room temperature and in the absence of an applied electric potential.

9. Regarding the level of one ordinary skill, level of predictability in the art, the guidance provided by the applicant, and the working examples factors. MPEP 2164.05(b) states, "The relative skill of those in the art refers to the skill of those in the art in relation to the subject matter to which the claimed invention pertains at the time the application was filed." MPEP 2164.02 states "The specification need not contain an example if the invention is otherwise disclosed in such a manner that one skilled in the art will be able to practice it without undue experimentation.... Lack of a working example, however, is a factor to be considered, especially in a case involving unpredictable and undeveloped art." MPEP 2164.03 states, "The amount of guidance or direction needed to enable the invention is inversely related to the amount of knowledge in the state of the art, as well as the predictability in the art. The amount of guidance or direction refers to that information in the application as originally filed that teaches exactly how to make or use the invention. The predictability or lack thereof in the art refers to the ability of one skilled in the art to extrapolate the disclosed or known results to the claimed invention."

10. The level of one of ordinary skill in the art of semiconductor doping is considered by the examiner to be high, as the technology and methodology for doping semiconductor materials has been known for some time. However, it is the examiners position that the level of unpredictability in the art of semiconductor nanocrystal doping is high. The doping of semiconductor nanocrystals is a largely undeveloped art, and it is

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not clear from the prior art which materials and methodologies provide the necessary means for achieving a desired goal. Although the applicant in the instant specification provides a quite thorough disclosure of the material properties exhibited by the claimed invention, in regards to actual materials that exhibit these properties the specification only really shows that the materials CdSe, CdS, and ZnS can exhibit the applicants disclosed properties, and as shown by figure 3, even these materials are not capable of maintaining these properties indefinitely at the claimed conditions (room temperature and no applied electric potential. The applicant has indicated in the instant specification that semiconductor nanocrystals can be made from a wide variety of materials, which the examiner does not question. However, in light of the fact that even the applicants claimed materials are not capable of maintaining the applicant claimed properties at the claimed condition, and in light of the fact that the art is largely undeveloped and thus unpredictable, one with ordinary skill in the art would not be able to determine from this one example what materials other than CdSe, CdS, and ZnO (if these are presumed to even meet the applicants claim requirements) meet the material properties of the claimed invention without undue experimentation.

11. The applicant is referred to MPEP 2164.01(b) which states, "As long as the specification discloses at least one method for making and using the claimed invention that bears a reasonable correlation to the entire scope of the claim, then the enablement requirement under 35 U.S.C 112 is satisfied." In this case, the specification does not provide at least one method for making and using the invention that bears a reasonable correlation to the entire scope of claims 1-33 and 36-42. Rather, the

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specification only provides enablement for CdSe, CdS, and ZnO, as being able to be doped with a carrier selected from an electron and a hole, such that the carrier remains in a quantum confined state at room temperature and in the absence of an applied electric potential, when "remains in a quantum confined state" is construed in terms of minutes or hours.

Response to Arguments

12. Applicant's arguments with respect to claims 1-33 and 36-42 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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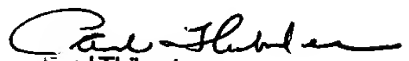
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.



nju
July 21, 2003



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700